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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/558,588	04/26/2000	Kenji Shibata	3008-03	1056

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EXAMINER

WILLE, DOUGLAS A

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 04/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/558,588

Applicant(s)

SHIBATA ET AL.

Examiner

Douglas A Wille

Art Unit

2814

-- Th MAILING DATE of this communication app ars on th cov r sheet with th correspondenc address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 –28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano et al. in view of Sasaki et al.
3. With respect to claim 1, Hatano et al. show a laser (Figure 3 and column 5, line 59 et seq.) with an active layer 45 of  $\text{In}_{0.5}\text{Ga}_{0.5}\text{P}$ , a p-clad layer 46 of  $\text{In}_{0.5}\text{Ga}_{0.2}\text{Al}_{0.3}\text{P}$ , and a p-intermediate layer 47 which is indicated as  $\text{In}_{0.5}\text{Ga}_{0.5}\text{Al}_{0.1}\text{P}$ . Note that the formula of layer 47 is not correct and since the layer is indicated as being low in Al (column 10, line 13) it is therefore interpretable as  $\text{In}_{0.5}\text{Ga}_{0.4}\text{Al}_{0.1}\text{P}$ . Thus layer 47 has a bandgap greater than the active layer and less than the clad layer 46. The layers are also lattice matched. Since Hatano et al. show a laser, there is no window layer but Sasaki et al. show a LED with similar materials (see Figure 3 and column 8, line 14 et seq.) that uses a window layer of GaP. It would have been obvious to modify Hatano et al. with the window layer of Sasaki et al. to provide a LED version of the laser.
4. With respect to claim 2, layer 47 has a wider bandgap than the active layer.
5. With respect to claim 3, layer 47 is p-type.
6. With respect to claim 5, the layer 47 has the same In concentration as layer 46 and is therefore lattice matched.

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7. With respect to claim 6, layers 44, 45 and 47 are InGaAlP, the active layer has Al = 0.0 and has a smaller bandgap than the clad layers. The window layer of Sasaki et al. is GaP and the layer 47 has a smaller bandgap than layer 46 (less Al) and there are p- and n-electrodes.
8. With respect to claim 8, the layers of Hatano et al. and Sasaki et al. show the claimed layers with the claimed bandgap differences (see paragraph 3 above)
9. With respect to claim 9, layer 47 has a larger bandgap than the active layer (more Al).
10. With respect to claim 10, layer 47 is p-type.
11. With respect to claim 12, layer 47 is lattice matched to layer 46 since the In concentration is the same.
12. With respect to claim 13 layer 47 is InGaAlP.
13. With respect to claim 14, the layers of Hatano et al. and Sasaki et al. show the claimed layers with the claimed bandgap differences (see paragraph 3 above)
14. With respect to claim 15, the layers of Hatano et al. and Sasaki et al. show the claimed layers with the claimed bandgap differences (see paragraph 3 above) and Sasaki et al. show the use of Zn in the window layer.
15. With respect to claim 16, Sasaki et al. show the window layer is GaP.
16. With respect to claim 19, the layers of Hatano et al. and Sasaki et al. show the claimed layers with the claimed bandgap differences (see paragraph 3 above).
17. With respect to claim 20 the window layer is GaP.
18. With respect to claims 4, 11, 18 and 22, Hatano et al. show the doping level of layer 47 is  $1 \times 10^{18}$  (column 6, line 10). Note also that Sasaki et al. shows the carrier concentration of layers 14, 15 and 17 as being  $5(10)^{17}$ ,  $2(10)^{18}$  and  $2(10)^{18}$  respectively.

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19. With respect to claims 17 and 21, Hatano et al. show the dopant is Mg while in Sasaki et al. the p-dopant is Zn. It would have been obvious to substitute Zn for Mg as a design alternative.

20. With respect to claims 23 – 28, the functional limitations carry no weight in claims drawn to a device but note that since the claimed structure is shown, the claimed functions are inherent in the structure.

### *Response to Arguments*

1. Applicant's arguments filed 2/3/03 have been fully considered but they are not persuasive.

2. Applicant states that the combination of Hatano et al. and Sasaki et al. does not show an insertion layer. But layer 47 of Hatano et al. has all the characteristics of what Applicant calls an insertion layer. Applicant also states that a window layer is not shown but note that Sasaki et al. show a layer of GaP which functions as a window layer since it has a wider bandgap than the preceding layers and is transparent to the emitted radiation as is required for a LED.

3. Applicant states that it is not understood what Examiner's conclusion is and is apparently confused by showing the features of claims 1 and 2 in the same paragraph. Claim 1 states that layer 47 has a smaller bandgap than layer 46 (this is shown) and claim 2 states that layer 46 has a larger bandgap than the active layer (layer 45 has no Al).

4. Applicant states that it is not understood how lattice matching is shown and asks if this is special knowledge known to Examiner. If the inventor did not understand this fact it would be truly surprising since it is well known in the art. If Applicant's representative does not understand this fact Examiner would be happy to enlighten him and attention is drawn to patent 5,744,829 which shows that the lattice constant of AlGaInP is to a high degree of precision only a function

of the In content and since all the layers of Hatano et al. have the same In content they have the same lattice constant.

5. Applicant comments on purported comments by Examiner with respect to traversal arguments but does not identify where these appear and is therefore not understood.

6. Applicant states that Hatano et al. do not discuss avoiding a potential barrier but this feature is not claimed and the claimed structure is shown by the prior art quoted.

7. Applicant states that Sasaki et al. solves the problem in a different manner and does not produce the potential avoidance. Again, it is noted that the feature is not a claimed feature and the claimed structure is shown.

8. Applicant states that Hatano et al. show impurity concentration and not carrier concentration but, first it is not understood why they are different and second, it is noted that Sasaki et al. show carrier concentrations in the claimed range.

9. Applicant states that claim 7 requires an active layer with Al. This is not true. Claim 7 states the active layer is of the AlGaInP system and Hatano et al. identifies the same system with the formula  $\text{In}_{0.5}(\text{Ga}_{1-x}\text{Al}_x)_{0.5}\text{P}$ . Thus the claimed material is shown and can include  $x = 0.0$ . Note that the use of AlGaInP material system is not a stoichiometric formula.

10. Applicant states that it is not understood where the Zn doped window layer is shown in Sasaki et al. See the rejection above.

11. Applicant states that it is not understood why the substitution of Zn for Mg is obvious. It is noted that both Mg and Zn are known dopants for the material system under consideration and the selection of one over the other is not a distinguishing characteristic unless it can be shown

that unexpected results are obtained. It is not clear why one would ask for an affidavit to demonstrate this fact.

12. Comments related to the new claims are addressed in the rejection above.

***Conclusion***

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

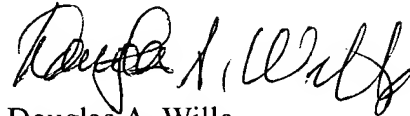
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas A Wille whose telephone number is (703) 308-4949. The examiner can normally be reached on M-F (6:15-3:45).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

A handwritten signature in black ink, appearing to read "Douglas A. Wille".

Douglas A. Wille  
Patent Examiner

April 2, 2003